

state & society

NRC takes a closer look at plutonium recycling

Should we recycle plutonium? Do economic, safety and health considerations make it feasible to reprocess spent fuel for reuse in light-water reactors? The Nuclear Regulatory Commission has recently announced a more cautious view of plutonium recycling than the one held by its predecessor, AEC—a view that would delay until 1978 the decision on whether to allow plutonium recycling and under what constraints. We spoke with several researchers concerned with plutonium issues and they outlined for us the importance of the new NRC stand and what a decision either way in 1978 would mean to the present nuclear-power industry and the infant breeder-reactor program.

The provisional view. NRC now feels that a cost-benefit analysis of safeguard alternatives should be considered before any decision is made on the wide use of recycled plutonium as fuel for light-water reactors. This analysis is needed, NRC officials say, to comply with requirements of the National Environmental Policy Act. In the meantime, no additional licenses would be granted for mixed (uranium and plutonium) oxide fuel, except for experimental purposes. For fuel cycle activities (other than nuclear-power reactor construction and operation), no further licenses should be granted, NRC says,



TAYLOR

that would foreclose future safeguard options.

The new NRC view is a welcome change in the eyes of Theodore B. Taylor (International Research and Technology Corp.). "I feel better about the new policy than about the old," he said. "The former AEC stand did not require them to go into gory detail about what the plutonium safety and safeguard

modifications would be—they were proposing to go ahead and issue licences pending some probable modifications of the regulations . . . The AEC acted as though plutonium recycling *was* going to happen.

"Now that's been changed," he continued. "The implication in the NRC statement is that they expect to allow plutonium recycling at some time in the future, but they don't flatly say that it is going to happen. NRC hasn't said what the new licensing requirements would be if they allowed plutonium recycling—and I think they are being realistic in taking three years to decide on them." Taylor also told us that intensive NRC safeguard studies are underway and that detailed results will become available through the summer.

Effects on nuclear power. The question remains: What effect does this stand have on the nuclear-power industry? William Higinbotham (Brookhaven) emphasized that the waste disposal problem from light-water reactors is potentially a serious one. "If there is no breeder program and no plutonium recycling, we would have more spent-fuel rods than we could handle." He went on to explain, "Plutonium recycling *per se* is economically marginal. If we forget about plutonium recycling and go directly into recycling via the

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Standing in the limelight: the visible scientists

Energy problems, reactor safety, ozone depletion—all are issues that affect the public and thus pack the potential to elevate more physicists to the ranks of "visible scientists." These are the outspoken scientists, frequently in the news, who take stands on controversial issues and go straight to the public with their views.

In a doctoral dissertation submitted to the communications department at Stanford University, Rae Goodell (now a postdoctoral fellow at the Massachusetts Institute of Technology) has taken a hard look at the visible scientists and their influence on science communication. Questionnaires completed by a 24-member panel composed mostly of science news writers yielded the list of 39 visible scientists upon whom Goodell concentrated her study. (Thirteen are

physicists or in physics-related fields.) It is the product of some five years work that includes 95 personal interviews as well as more traditional forms of research.

Citing "... activities in the messy world of politics and controversy" as the vehicle by which today's visible scientists become known, Goodell characterizes them as "knowledgeable, articulate, dramatic, persistent and sophisticated about press operations." While most were firmly established in the scientific community before venturing into public life, once there, Goodell notes, they speak out on science-related policy issues rather than science, "speaking from personal conscience, not group consensus."

Coming out. What factors contributed to the emergence of visible scientists?

The needs and concerns of the public, the media, the government and the scientific community exerted selective pressures that produced today's scientific newsmakers. After development of the atomic bomb, Goodell believes, "Both the practical need for money and the moral sense of responsibility spurred scientists to get out of the laboratory and interact with government and public."

Behind-the-scenes science advising ("inside" activity) flourished during the 1950's, but by the late 1960's dissatisfaction with what was regarded as the advisory system's secrecy and ineffectiveness led scientists to involvement in lobbying, political campaigning, speaking out in the press and taking litigation to the courts ("outside" activity). In addition, public disenchantment with

The most visible of the scientists

Listed below are the names of 39 scientists judged most visible by the panel of 24 science writers that Goodell consulted while preparing her dissertation. Each name is followed by the number of panel members who mentioned it. Goodell did the survey during August 1972, before White and Leakey died.

Barry Commoner	19	William Shockley	5
Paul Ehrlich	14	Ralph Lapp	5
Margaret Mead	10	Carl Sagan	4
Linus Pauling	10	Philip Abelson	3
Edward Teller	9	Christiaan Barnard	3
Joshua Lederberg	9	Noam Chomsky	3
Wernher von Braun	8	Denton A. Cooley	3
George Wald	8	Edward E. David Jr	3
Glenn Seaborg	7	John Foster	3
James Watson	6	John Gofman	3
Paul Dudley White	6	Fred Hoyle	3
Isaac Asimov	6	Daniel P. Moynihan	3
Michael DeBaakey	6	Frank J. Rauscher Jr	3
René Dubos	6	Admiral Hyman G. V. Rickover	3
B. F. Skinner	6	Albert Sabin	3
		Jonas Salk	3
		Benjamin Spock	3
		Harold Urey	3
		Jerome B. Wiesner	3
		Philip Handler	2
		Edwin Land	2
		Jean Mayer	2
		Karl Menninger	2
		Louis S. B. Leakey	2

technology was beginning to hit science in the pocketbook. In 1971 Wolfgang K. H. Panofsky (SLAC), in an interview with Goodell, described science as caught between forces demanding a better economic return from research and forces demanding more social relevance. Simultaneously there was the ever-present eagerness of the media for exciting stories and the cooperation of accurate, fluent sources.

When the Federation of American Scientists was formed in 1946, nearly all of the founders and members were physicists; now, 25% are physicists. Goodell believes that physics, "formerly at the top of the pecking order," faded into the background as national priorities shifted from space exploration and the arms race to biological and social problems. As she sees it, the public wants "pollution solutions, not particle physics," but she does consider it reasonable to speculate that physics may return to the forefront as solutions to energy, ozone depletion and reactor-safety questions are sought.

Consequences. The visibility game has an impact on everyone involved. Popular science heroes risk ostracism by their colleagues for abandoning their laboratories, speaking outside their areas of expertise or circumventing the referees of technical journals by taking their messages right to the public. Goodell maintains that the referee system protects scientific quality control, noting that "*Physical Review Letters* set a precedent in 1960 by announcing that it would reject papers whose main contents had already appeared in the daily press." The lay press cannot provide such rigorous screening of technical material. It is also important to re-

alize that domination of the news by a small proportion of scientists is conducive to distortion of the issues. What about the views of *invisible* scientists?

On the positive side, visible scientists are reaching out to the public, arousing its enthusiasm and maybe enlivening science's image. Goodell advocates a dual remedy for the flaws in the visibility system: More scientists must become involved, and when they speak out on science-related issues they must indicate whether they are doing so as scientific authorities or as concerned citizens. Using one's professional reputation as a springboard to publicize unrelated personal views raises sticky ethical questions.

It is interesting and perhaps ironic to note that Rae Goodell's analysis of the criteria for visibility has—unintentionally—met those very same criteria. *The Visible Scientists* is due to be published in book form in the Spring and has already been the subject of an article in *The New York Times* as well as features in several magazines. Goodell describes her situation as "a case of the biter getting bitten." —DG

Richard Roberts moves to ERDA nuclear post

The Energy Research and Development Administration has a new assistant administrator—Richard W. Roberts, former director of the National Bureau of Standards. Roberts will oversee nuclear-energy research, which is the largest share of energy R&D at ERDA.

He comes to his new position after more than two years at NBS. Before serving in government posts, he was

manager of Materials Science and Engineering at General Electric's Research and Development Center. While there, he was involved in a number of nuclear programs relating to both boiling water and breeder reactors.

Guidelines issued for solar-energy institute

An interim report to the Energy Research and Development Administration recommends formation of a Solar Energy Research Institute at a single site and operated under contract by one or more universities. The institute must be independent and have its own director and mission. The National Research Council prepared the report to help determine the nature of the institute that must be established because of the Solar Energy R&D Act of 1974.

NRC notes in the report that a broad range of talent should be assembled to address both short- and long-range problems. Also, the cost of a particular solar-energy technology must be compared with other energy sources using the same level of technology.

A final report to ERDA is expected in September. In preparation for this, a workshop is scheduled for 28 July to 8 August; participants include members of the committee that produced the interim report and representatives of appropriate governmental agencies, industry, educational institutions and other organizations.

Ten nations reorganize European space efforts

Europe now has a unified civilian space agency. Ceremonies on 30 May marked the beginning of the European Space Agency, which takes over the functions of the European Launcher Development Organization (disbanded last year) and the European Space Research Organization. The new agency is designed to pool the efforts of ten countries—Belgium, Denmark, France, West Germany, Italy, The Netherlands, Spain, Sweden, Switzerland and Great Britain—for such projects as Spacelab, a launcher and several satellites. There are also nonmember countries, including Norway, Austria and Canada, that will act as observers and participate in certain of the projects.

Heading ESA as director-general is Roy Gibson of Great Britain, who joined the European Space Research Organization in 1967; he was formerly an administrator in the UK Atomic Energy Authority. The 1976 budget for ESA is expected to be \$450 million.

One of the most ambitious of the projects underway is Spacelab—a fully reusable set of research modules that will be launched by NASA's Space

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